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ABSTRACT

The characteristics of graduate physics and astronomy students are examined in this survey and their employment opportunities after graduate school are described. (The physics students have been surveyed annually for over 15 years, but this is only the second year that astronomy students have been included.) Highlights of this report are: (1) a continuing decrease in the number of graduate physics students and degree recipients; (2) a higher proportion of new graduates accepted positions that make extensive use of their physics training; (3) at the doctoral level there were more employment opportunities for experimentalists than for theoreticians; and (4) astronomers spend less time on their doctorates than physicists. Statistical tables are included. (Author/LBH)

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1975–76 GRADUATE STUDENT SURVEY

by Susanne D. Ellis

AIP Pub. No. R-207.9 July 1977

This survey examines the characteristics of graduate physics as well as astronomy students, and describes their employment opportunities as they leave graduate school. While the physics students have been surveyed annually for over fifteen years, this is only the second year that the astronomy students have been included. Highlights of this report are:

- a continuing decrease in the number of graduate physics students and degree recipients
- a higher proportion of new graduates accepted positions that make extensive use of their physics training
- at the doctoral level there were more employment opportunities for experimentalists than for theoreticians
- astronomers spend less time on their doctorates than physicists

For the academic year 1975–76 the total graduate physics student population declined to 10372 from a high of 15000 in 1966–67. Over 80% of the graduate physics students are enrolled as full-time students at physics doctorate-granting institutions. The data presented in the tables and figures of this report come from individual graduate students whose names were supplied by department chairmen. The total number of respondents to this survey was 5817 or 71% of the 8200 students' names we received. The data selected for inclusion in this report vary somewhat from year to year so as to respond to the maximum number of requests for the information. Also, throughout the year more detailed analyses are prepared for specific requests.

Both **Figures I** and **II** show the changes that occurred in the employment market for graduate physics degree recipients since 1970. While the opportunities for graduates with doctorates have improved, new physics masters experienced greater difficulties in securing initial employment in 1976. Not only were there fewer graduates with multiple job offers among the new masters, a drop from 24% to 17%, but also the fraction of graduates without job offers increased from 20% to 28% in one year; these changes are presented in **Figure II**. The doctoral graduates on the other hand experienced a leveling-off where the percentage of graduates without offers is concerned, and at the same time 39% of the new doctors, compared with 35% in 1975, received multiple offers to choose from.

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Fig. I. Employment offers for new physics doctoral degree recipients, 1970–76

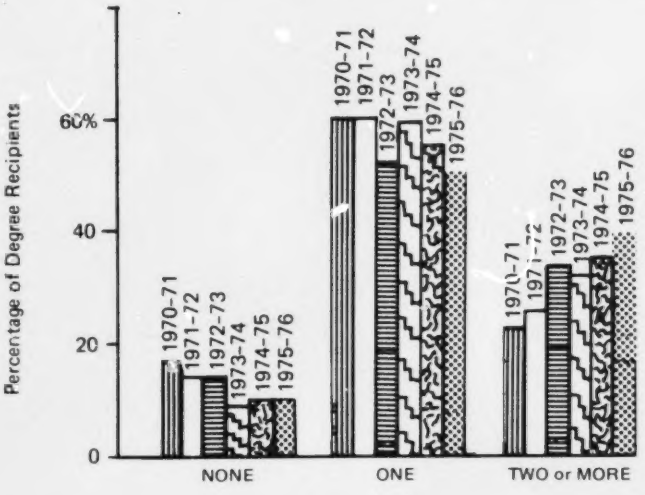


Fig. II. Employment offers for new physics masters, 1970–76

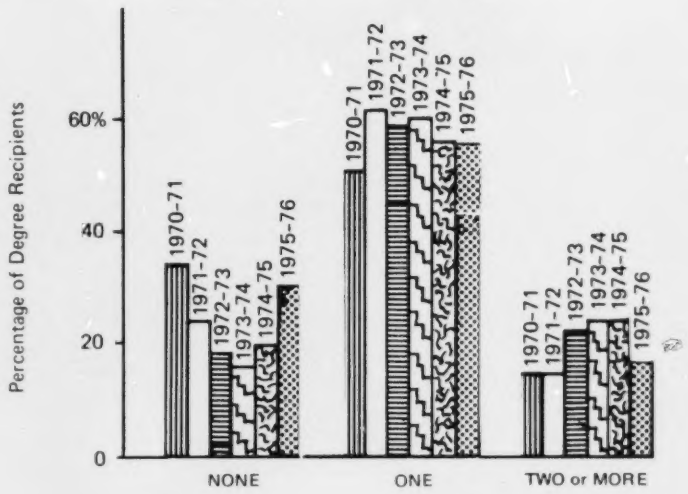


Table I. Characteristics of the graduate physics student population, 1975–76

		All graduate students	First-year graduate students	Degrees granted: Terminal master's	Degrees granted: Doctorate
	Total Population*:	10372	2646	746	1111
	Number of respondents:	5817	1193	275	548
Sex	Female	8%	9%	10%	5%
	Male	92	91	90	95
Citizenship	US	80%	87%	81%	78%
	Foreign	20	13	19	22
Type of high school physics	PSSC**	33%	34%	33%	26%
	Project physics	3	5	4	3
	Other	57	51	54	67
	None	7	10	9	4
Type of bachelor's institution	PhD-granting	53%	54%	42%	56%
	MS-granting	11	14	19	6
	BS-granting	19	22	23	18
	Foreign	17	10	16	20
Type of graduate institution	PhD-granting	92%	83%	68%	100%
	MS-granting	8	17	32	—
Student status	Full-time	91%	86	84%	93%
	Part-time	9	14	16	7
Source of support	Teaching assistantship	38%	50%	47%	16%
	Research assistantship	35	12	11	56
	Fellowship	10	11	5	11
	Employment	11	17	23	10
	Family, savings, loan	3	6	6	4
	Other	3	4	8	3

* *These totals were reported by physics department chairmen as part of the Survey of Enrollments and Degrees.*

** *The Physical Science Study Committee (PSSC) course material became available for general use in 1960. Since the late 1960's the percentage of graduate physics students who took PSSC in high school has increased and leveled off.*

Table I examines seven characteristics of the total graduate physics student population and shows how some of them vary for the three subgroups—the first-year graduate students and two groups of graduate degree recipients. For example, among the first-year students the proportion of women is almost twice as large as that of the doctoral graduates. On the other hand, foreign students who come to the U.S. to attain a doctorate in physics, have a relatively low attrition thereby comprising only 13% of the first-year students, but 22% of the PhD graduates.

The survey response from terminal masters is rather low, hence one should examine the statistics with greater care. Yet it seems reasonable for the terminal masters to have the highest proportion of part-time students of the four groups listed in **Table I**, because graduate students who expect to terminate their studies at the master's level, frequently hold industrial positions and consequently study on a part-time basis. In comparison with previous years none of the characteristics have changed very much.

The number of minority students interested in becoming physicists continues to be a topic of many inquiries. **Table II** presents five characteristics of six specific minority groups to which "Other Spanish" and "Other" were added. The six groups are listed on the questionnaire and graduate students are asked to identify themselves in case they are members of any of them. Each year Orientals comprise by far the largest single minority group, 46% of all the students described in **Table II**, but only 17% of the Orientals are U.S. citizens. The Asian Indian graduate students who form the second largest minority group, include only 1% who are U.S. citizens. A look at women graduate students among the large minority groups points to much higher proportions, namely 11–13%, as compared with the 8% women among the total graduate physics student population.

An important aspect of **Table II** is that the first row "Total number" represents eight groups of graduate students who responded to a sensitive question; these numbers should not be regarded as totals for each of those minority groups. At present we have no method for determining the response rate of individual minorities to compare with the overall response to the Graduate Student Survey. The exception, however, is the number of black degree recipients because it is a number reported by department chairmen for the Survey of Enrollments and Degrees, (AIP R-151), and for the year 1975–76 ten terminal master's degrees and eight doctorates were the reported totals for blacks. In the 1975–76 Graduate Student Survey only two black terminal masters and five black doctorate recipients identified themselves as such.

Table II. Characteristics of minority-group graduate physics students, 1975–76

Characteristics		Black	Puerto Rican	Mexican American	Other Spanish	American Indian	Asian Indian	Oriental	Other
	Total number	72	17	18	30	10	231	525	235
Sex	Female	9	--	1	3	--	27	58	15
	Male	63	17	17	27	10	204	467	220
Citizenship	U.S.	58	17	16	7	10	2	88	153
	Foreign	14	--	2	23	--	229	437	82
Full-time equivalent yrs of graduate study	≤ 1	15	2	8	10	2	26	93	54
	2	19	5	2	8	--	41	113	66
	3	12	2	4	4	4	41	85	38
	4	6	2	4	4	3	43	78	24
	5	10	3	--	4	--	28	71	26
	6	5	2	--	--	--	27	58	17
	≥ 7	5	1	--	--	1	25	27	10
Student status	Full-time	63	15	14	25	8	226	507	215
	Part-time	9	2	4	5	2	5	18	20
Specialties	Biophysics	3	--	--	1	--	8	23	13
	Atomic & molec.	3	5	--	1	1	9	39	14
	Elem. particles	8	1	--	3	--	32	58	33
	Fusion, plasma	3	--	2	--	--	9	35	16
	Nuclear	4	3	3	3	1	29	62	30
	Physics gen.	10	--	2	3	1	5	20	16
	Solid state	18	3	5	8	1	78	156	58
	Other subfields	23	5	6	11	6	61	127	55
Graduate degree recipients	Terminal master's	10	1	2	1	--	9	23	13
	Doctorate	8	--	--	2	--	20	66*	

* *Only 8 out of the 66 doctors are U.S. citizens.*

Table III estimates the total number of graduate students in nine major subfields and shows the distribution of students within each subfield for each level of graduate study in 1975–76. A major function of this table is to indicate the approximate number of degree recipients who may seek employment in a given subfield within a two-year period; the median number of years spent to get a PhD is five. A comparison of the subfield distribution (the last column in **Table III**) with that of the previous year indicates few changes; only fusion, plasmas, and elementary particles increased noticeably.

Table III. Graduate physics students enrolled in 1975–1976 by subfield and years of graduate study completed

		Full-time equivalent years of graduate study									Total graduate students	
		≤ 1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	≥ 9 yrs.		
Distribution* of students:	N	2646	2168	1514	1362	1265	768	373	145	124	10372**	100%
	%	25.5	20.9	14.6	13.2	12.2	7.4	3.6	1.4	1.2		
Physics subfields												
Astrophysics		6.6%	4.7%	6.4%	7.5%	7.2%	6.1%	8.2%	12.2%	9.5%	674	6.5%
Atomic & molecular		4.5	5.9	7.1	8.7	9.4	8.9	9.7	8.5	15.8	747	7.2
Biophysics		4.0	4.1	4.0	3.8	4.0	2.8	4.6	7.3	7.9	415	4.0
Elem. particles		10.3	11.9	15.4	15.8	14.0	15.8	12.2	9.7	12.7	1369	13.2
Fusion, plasmas		5.3	5.2	7.3	5.4	5.3	8.0	8.2	4.9	--	612	5.9
Nuclear physics		7.5	12.7	11.9	10.4	10.9	11.1	7.6	12.2	4.8	1089	10.5
Optics		3.8	5.6	2.3	2.9	4.0	3.0	4.1	3.7	1.6	394	3.8
Relativity		2.7	2.6	2.8	2.3	3.7	2.8	3.6	1.2	1.6	292	2.8
Solid state		19.1	20.5	25.2	29.0	26.4	29.3	26.0	19.5	35.0	2479	23.9
Physics, general		16.5	8.5	3.4	1.5	--	--	--	--	--	633	6.1
Other subfields		19.7	18.3	14.2	12.7	15.1	12.2	15.8	20.8	11.1	1670	16.1
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	10372	100.0%

* *The distribution of students in each subfield is based on the 5817 respondents to this question.*

** *This total was derived from the Survey of Enrollments and Degrees.*

Table IV. Sources of support for graduate physics students by sex and degree status, 1975–76

Source of support		Sex		Candidates for:				Total	
		Women	Men	Terminal master's	Master's enroute to PhD	PhD after master's	PhD only	N	%
Teaching assistantship		45%	36%	41%	50%	28%	36%	2096	37
Research assistantship		23	34	9	16	45	41	1891	33
Fellowship		10	10	4	8	10	12	544	10
Employment		11	10	25	12	8	4	589	10
Family, savings, loan		5	3	8	5	3	2	196	3
Other		1	3	8	3	2	2	175	3
Multiple sources of support, primarily with teaching assistantship		5	4	5	6	4	3	236	4
		100%	100%	100%	100%	100%	100%		
Total respondents	N	457	5270	756	1192	2260	1518	5727	
	%	8%	92%	13%	21%	39%	27%		100%

Table V. Number* of advanced graduate physics students specializing in selected experimental or theoretical subfields by years of graduate study completed, 1975–76

Physics subfields	Type of research	Full-time equivalent years of graduate study: 3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	> 9 yrs.	Total
Astrophysics	experimental	42	27	33	25	17	6	4	154
	theoretical	36	54	46	15	11	4	4	170
Atomic & molecular	experimental	61	73	61	44	29	4	6	278
Biophysics	experimental	27	13	27	13	10	8	4	102
Elem. particles	experimental	104	79	90	65	29	8	15	390
	theoretical	124	130	77	59	13	6	--	409
Fusion, plasmas	experimental	36	31	21	25	15	6	--	134
	theoretical	52	29	29	27	10	--	--	147
Nuclear physics	experimental	109	71	84	65	13	13	6	361
	theoretical	55	46	36	17	8	--	--	162
Optics	experimental	17	19	25	15	13	2	--	91
Relativity	theoretical	46	31	44	21	10	2	--	154
Solid state	experimental	270	260	194	170	65	15	27	1001
	theoretical	86	94	92	48	19	6	10	355
Other subfields	experimental	69	65	69	40	21	10	8	101
	theoretical	122	101	88	71	27	13	8	326
Total**	experimental	735	638	604	462	212	72	70	2612
	theoretical	521	485	412	258	98	31	22	1723

* *The numbers in this table have been scaled up to reflect the total number of graduate students (5558) who completed three or more years of graduate study.*

** *In addition to the graduate students working on an experimental or theoretical thesis there are an estimated 1223 graduate physics students who describe their studies as both experimental and theoretical.*

Table VI. Type of research performed by doctoral candidates with respect to years of gradute study, 1975–76

Type of research	Full-time equivalent years of graduate study 3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	≥ 8 yrs,	Total ≥ 3 yrs.
Experimental	44%	46%	47%	53%	57%	50%	47%
Theoretical	31	34	32	29	26	19	31
Both	25	20	21	18	17	31	22
Total	100%	100%	100%	100%	100%	100%	100%
Number of students	1514	1369	1265	768	373	269	5558

Reviewing the different sources of support for graduate students, one finds in **Table IV** that those students enrolled in doctoral programs which do not call for a master's degree enroute, include the highest percentage of students on fellowships and the lowest percentage of employed students. Traditionally, as students progress through graduate school they exchange their teaching assistantships for research assistantships.

A frequent question asked of us is the one dealing with the number of years it takes to complete an experimental doctoral thesis in comparison with a theoretical one; **Tables V** and **VI** attempt to answer this question. Since three years of graduate work is reported to be the minimum time in which students complete a physics doctorate, both tables start with third year students. The last colum in **Table VI** shows what proportion of all the advanced graduate students are involved in experimental, theoretical, or both types of research. The table gives some indication that a dissertation based on experimental research takes longer than a theoretical dissertation; the respective medians are 5.2 years of graduate study for experimentalists and 4.9 years of graduate study for theoreticians. Specific subfields and estimated number of graduate students performing experimental or theoretical research in each, are shown in **Table V.** While listing only the largest subfields, **Table V** gives some indication of the ratio between the number of students engaged in experimental or theoretical research for specific subfields. Elementary particles is perhaps an interesting example of a subfield almost equally divided between theoreticians and experimentalists, and the data show that theoreticians complete their graduate work in that subfield in a shorter time than the experimentalists.

The survey response from graduates who received terminal master's degrees is consistently low which can only be explained in terms of a high mobility following graduation. Statistics show that they have a relatively difficult time securing employment; perhaps because the masters are not as highly trained as the doctorate recipients and on the other hand they command a higher salary than the physics bachelors. **Table VII**, based on 279 respondents, presents detailed information on what the graduates plan to do with terminal master's degrees in physics. As expected the largest proportion, (74%) seek immediate employment, and the subfields these masters specialized in appear to determine how readily employers make offers to them. For example, graduates who specialized in one of the more applied subfields such as acoustics, electronics, engineering physics or optics, though few in number, were more likely to receive job offers.

While the distribution of masters among the subfields is basically similar to that of the year before, physics education is the exception by decreasing from 10% to less than 4%. This decline may reflect an awareness of fewer openings in secondary schools for physicists with graduate training or that prospective teachers prefer to enroll in science education departments rather than in physics departments.

Table VII. Post-degree plans by subfield of terminal masters, 1975–76

Physics subfield	Post physics master's-degree plans: Total in subfield	Other graduate study	Career military	Undecided	Percentage of masters in each subfield: Employment offers received: 0	1	≥ 2
Acoustics	3.4%	---	5	---	11%	78%	11%
Astrophysics	3.7	2	1	---	22	67	11
Atomic & molecular	3.7	---	1	1	50	40	10
Biophysics	4.1	2	1	---	10	60	30
Electronics & eng. physics	7.8	3	1	1	17	50	33
Fusion	4.1	1	4	1	30	60	10
Nuclear	12.3	6	4	---	33	45	22
Optics	6.0	2	4	---	13	73	14
Solid state	13.1	6	---	---	22	56	22
Physics education	3.7	---	---	---	20	60	20
Physics, general	20.5	13	2	---	30	65	5
Other subfields	17.6	7	2	3	25	45	30
Total	100.0%	15%	9%	2%	24%	39%	11%
No. of respondents	279	42	25	6	66	108	32

Fig. III. Post-degree plans of physics terminal master's degree recipients, 1975–76

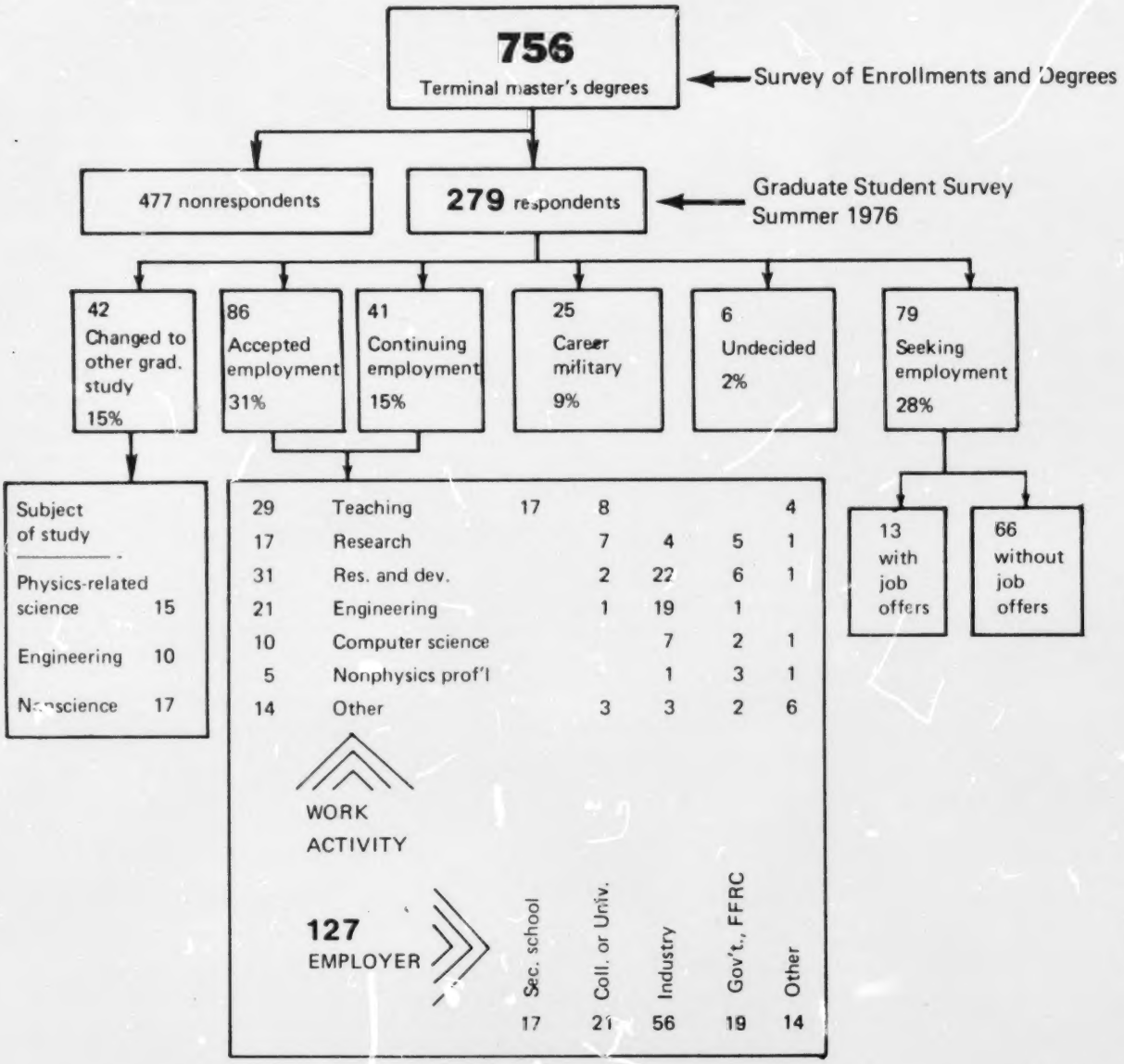


Table VIII. Median monthly salaries for new graduate physics degree recipients, 1976**

Type of employer	Terminal master's recipients: Percentage accepting positions	Terminal master's recipients: Monthly starting salary	Doctorate recipients: Percentage accepting 'Postdocs'	Doctorate recipients: Potentially permanent pos.	Doctorate recipients: Postdoctoral fellowships salary	Doctorate recipients: Monthly starting salary
Secondary school	11%	$ 860	---	---	---	---
4-year college	---	*	*	5%	*	$1040
University	12	900	33%	18	$1005	1070
Industry	38	1130	*	18	*	1590
Government	24	1350	4	6	1244	1625
Fed. funded research centers	5	---	4	6	1100	1530
Other	10	900	3	3	1050	1100
All employers	100%	$1110	100%		$1010	$1300

* *Fewer than 20 graduates reported salaries.*

** *The salaries shown in this table are based only on newly accepted positions.*

Table IX. Employment offers for 1975–76 doctorate recipients by subfield and type of research

Physics subfield	Total in subfield	Percentage of graduates within subfield received: 0 offer	1 offer	> 2 offers	Type of research	Percentage of graduates within subfield received: 0 offer	1 offer	> 2 offers	
Astrophysics	7.4%	14%	51%	35%	theor.	17%	50%	33%	100%
Atomic & Molecular	10.8	8	57	35	exp.	7	60	33	100
Biophysics	4.2	5	50	45	exp.	0	46	54	100
Elementary particles	16.3	12	38	50	exp.	3	38	59	100
					theor.	18	41	41	100
Fusion	6.6	16	42	42	theor.	22	44	34	100
Nuclear	10.0	2	62	36	exp.	0	63	37	100
					theor	10	50	40	100
Optics	3.4	0	63	37	exp.	0	67	33	100
Solid state	26.1	15	57	28	exp.	14	49	37	100
					theor.	16	75	9	100
Other subfields	15.2	---	---	---		---	---	---	
Total	100%	10%	51%	39%	exp.	8%	52%	40%	100%
					theor.	18	52	30	100

Figure III elaborates on the information presented in **Table VII** by showing not only the post-degree plans but also the employers and work activities of those masters who accepted the employment offers referred to in **Table VII.** Graduates choosing a career in the military service often do so because it enables them to become involved in research and development work. The fraction of the masters who continue graduate studies but in a different discipline, increased from 13% to 15% in one year.

The overall salaries for graduate degree recipients shown in **Table VIII** represents a 1% increase for masters and a 3% increase for doctorate recipients when compared with the previous year. The salaries reported for specific employers, however, show greater changes in some cases. For example salaries paid by the government to new masters increased by 20%, and postdoctoral fellowships offered by universities increased by 5% between 1975 and 1976.

If there is one table in recent Graduate Student reports that has received major attention it is the table that relates the graduate specialties to the employment offers for PhD recipients. Lately many inquiries have specified that the additional detail of the type of research, whether experimental or theoretical, and its relation to employment offers would also be very useful. **Table IX** takes those requests into account and, in its first five columns updates the information presented in earlier reports, while the last three columns show the employment offers in relation to some of the experimental or theoretical subfields. A comparison between the two columns titled "zero offers" in **Table IX** points to distinct differences within certain subfields. For example, all the experimental nuclear physicists received employment offers while 10% of the theoreticians were still seeking employment at the time of graduation. The bottom part of **Table IX** groups all the experimentalists and all the theoreticians together for the class of 1976 and shows that a higher percentage of theoreticians, namely 18%, compared to 8% of the experimentalists did not have employment offers by the end of the summer of 1976.

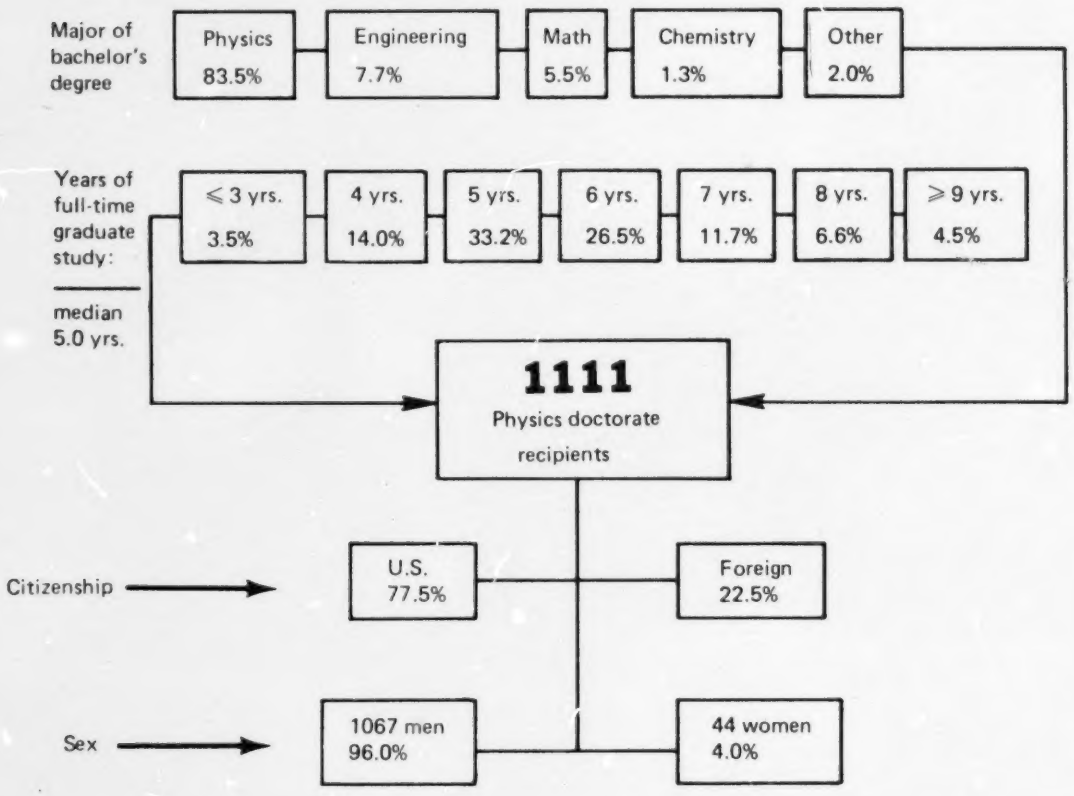
Table X relates the first work activities to the major subfields and the type of doctoral research. In the previous year management training and engineering were listed among the work activities for doctorate recipients with 1% and 2% respectively; this year only one graduate reported management training and four specified engineering. The distribution of those work activities shown in **Table X** changed little from the previous year.

Table X. Work activity and physics subfield for new doctorate recipients, 1975–76

Selected subfields of doctoral research		Teach.	Teach. and res.	Res.	Res. and dev.	Computer science	Other	Total N	Total %
Astrophysics *		1	4	20	3	2	1	31	7
Atomic & molecular	exp.	2	2	19	6	1	2	32	7
Biophysics	exp.	---	3	6	1	---	1	11	3
Elementary particles	exp.	---	1	29	1	2	1	34	8
	theor.	---	1	23	1	---	5	30	7
Fusion *		---	4	20	4	1	---	29	7
Nuclear	exp.	4	3	23	1	---	1	32	7
	theor.	---	---	7	2	---	1	10	2
Optics *		3	---	7	8	---	---	18	4
Solid state	exp.	---	16	39	16	1	6	78	18
	theor.	6	1	17	2	2	2	30	7
All subfields incl. the above	N	27	51	247	72	12	30	439	
	%	6	12	56	16	3	7	100%	

* *All types of research: experimental, theoretical and both.*

Fig. IV. Background characteristics of physics doctorate recipients, 1975–76



Only one of the four characteristics of the 1975–76 doctorate recipients presented in **Figure IV** indicates a noteworthy change from previous years; the percentage of graduates with other than physics bachelor's degrees has increased for the class of 1976. In recent years over 90% of the doctorate recipients had majored in physics as undergraduates while this year 16.5% transferred into physics graduate work with bachelor's degrees from other disciplines.

With the great amount of attention energy research has received lately, it seemed relevant to ask newly-graduated physicists whether or not they are involved in energy-related work areas. **Table XI**, summarizing the answers to that question, indicates that very few physicists hold first positions that involve energy research.

Table XI. Graduate physics degree recipients involved in energy-related work activities, 1975–76

	Terminal master's recipients	Doctorate recipients
Total population:	746	1111
Number of survey respondents:	275	548
Energy-related work areas		
Nuclear	9	30
Fuels (coal, petroleum, natural gas)	6	7
Solar	7	9
Geothermal	0	0
Electric power	0	4
Conservation: energy-related	0	1
Environment and health: energy-related	2	6
Manufacturing: energy-related	2	2
Other	3	25
Subtotal	29	84
Not involved in any energy-related areas	71	191

The 1976 response from individual doctorate recipients was only 49% and 10% of those respondents reported no job offers as they continue to seek employment. The previous year's response was considerably higher, 63%, of whom 13% had not yet been successful in securing employment; since the response rate was lower in 1976, it may not be totally justified to conclude that the employment market has improved. Another evaluation of the employment market is the percentage of graduates who accept 'postdocs'; that percentage increased from 32% to 36% for the class of 1976 while the percentage of graduates with newly accepted positions remained constant. Other post-degree plans shown in **Figure V** include foreign students who return to their native countries after receiving the PhD, and a small fraction of doctorate recipients with non-traditional plans such as "other graduate study" and "career military".

Fig. V. Post-doctorate status of 1975–76 physics graduates

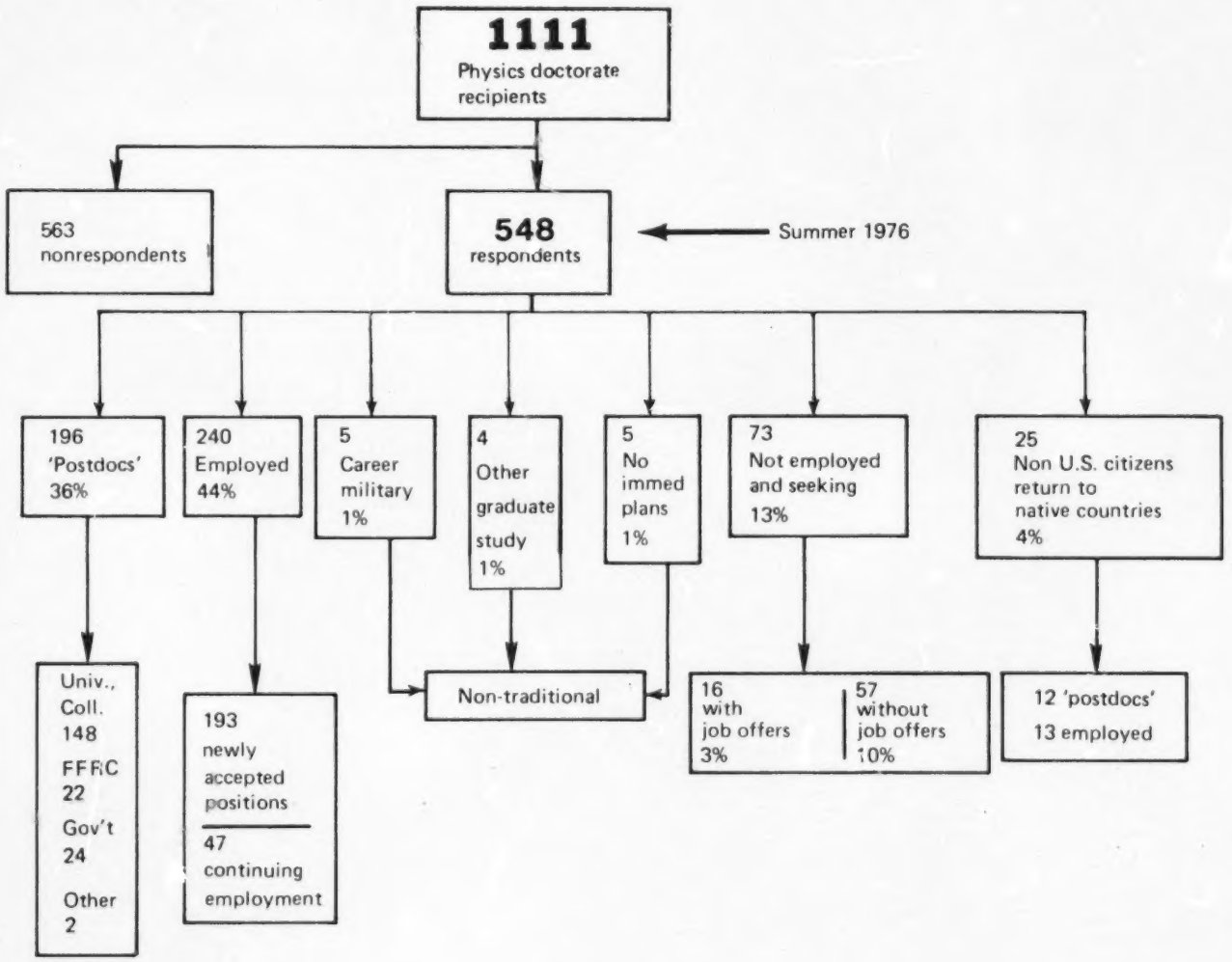
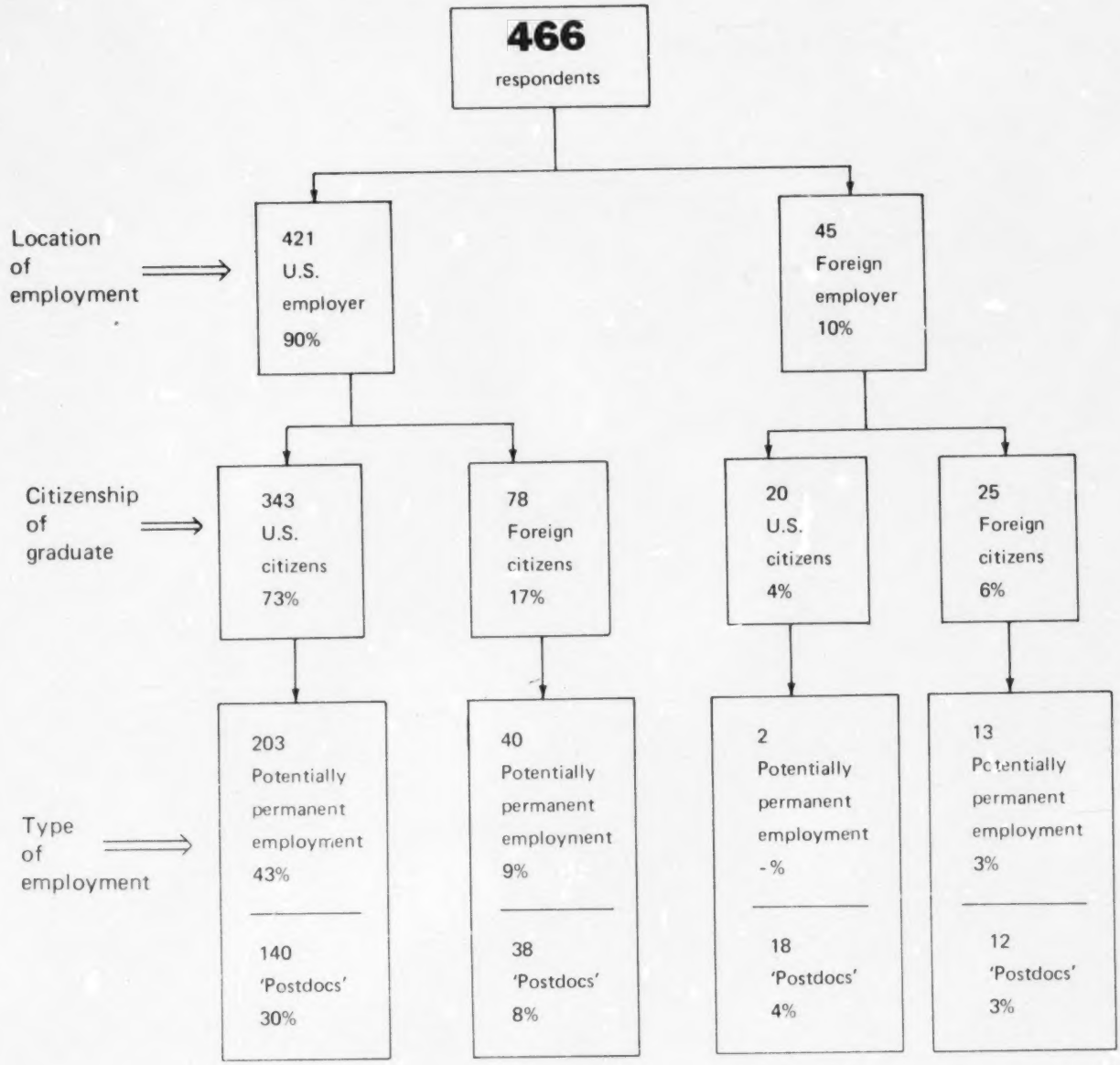


Fig. VI. Type of employment and citizenship of physics doctorate recipients—1975-76



In comparison with other disciplines physics attracts a large percentage of foreign graduate students most of whom work on a doctorate. In 1975-76 the foreign doctoral graduates again comprised 23%, but a larger proportion of them were offered potentially permanent employment in the U.S. than the year before; this proportion increased from 6% to 9% and is shown in Figure VI.

ASTRONOMY

Five years ago the Survey of Enrollments and Degrees was expanded to include astronomy data. Publication of the reports called attention to the changing number of degree-granting astronomy departments and their graduates. In response to requests for more detailed information on astronomy graduates the individual degree recipients and graduate students were contacted for the first time in the summer of 1975. The tables and flow diagram in this report are based on data collected in the summer of 1976 and focus on the academic year 1975–76 during which there were 843 graduate astronomy students enrolled in 57 degree-granting astronomy departments.

Table XII presents seven characteristics of two groups of students and two groups of degree recipients. The first two rows in this table compare the number of respondents with the total population of each group reported by the astronomy department chairmen.

When compared with the physics graduate students the astronomy students include a smaller proportion of foreign students and a larger proportion of women; also a higher percentage of the first-year students are on research assistantships and fellowships, namely 46% compared with 23% for the entering graduate physics students.

Table XIII presents the distribution of graduate students by level of graduate study and lists eight major subfields. Almost 40% of the graduate students described their research to be observational, and 23% of the students specified theoretical research in the given subfields. Among the astronomy students who are spending six or more years in graduate school only 17% classify themselves as theoreticians.

Of the 13 graduates with terminal master's degrees (presented in **Table XII**) three remained in graduate school and changed from astronomy to another science, six of them accepted employment in industry or the government and four were still seeking employment.

The doctoral graduates from whom we had a 64% response, are analyzed in **Figure VII**. As one might expect the majority of astronomy doctorate recipients studied physics as undergraduates and hold physics bachelor's degrees. To complete an astronomy doctorate takes less time than a physics doctorate; this difference is not only shown by comparing the medians given in **Figures IV** and **VII** but also by the fact that a larger proportion of astronomers than physicists take three years or less to complete the PhD, and only 14% of the astronomers, compared with 23% of the physicists, take seven or more years to complete the doctorate. The 23 graduates who accepted employment included two who chose a career with the military service. Of the three astronomers listed in the category "Other" post-doctorate plans, only one had no immediate plans and two continued their graduate studies in a non-science area.

Table XII. Characteristics of astronomy graduate students and degree recipients, 1975–76

Characteristics				Degrees granted	
		All graduate students	First-year graduate students	Terminal master's	Doctorate
	Total Population*:	843	162	35	89
	Number of respondents:	557	103	13	57
Sex	Female	12%	13%	8%	7%
	Male	88	87	92	93
Citizenship	US	92%	91%	92%	91%
	Foreign	8	9	8	9
Type of high school physics	PSSC**	34%	41%	17%	31%
	Project physics	2	3	8	4
	Other	59	52	67	63
	None	5	4	8	2
Type of bachelor's institution	PhD-granting	68%	61%	84%	67%
	MS-granting	7	7	8	2
	BS-granting	19	23	---	22
	Foreign	6	9	8	9
Type of graduate institution	PhD-granting	97%	93%	92%	100%
	MS-granting	3	7	8	---
Student status	Full-time	93%	96%	64%	87%
	Part-time	7	4	36	13
Source of support	Teaching assistantship	33%	33%	25%	14%
	Research assistantship	35	25	25	38
	Fellowship	14	21	---	22
	Employment	9	7	42	14
	Family, savings, loan	5	11	--	6
	Other	4	3	8	6

* *These totals were reported by physics department chairmen as part of the Survey of Enrollments and Degrees.*

** *The Physical Science Study Committee (PSSC) course material became available for general use in 1960. Since the late 1960's the percentage of graduate physics students who took PSSC in high school has increased and leveled off.*

Table XIII. Graduate astronomy students enrolled in 1975–76 by subfield and years of graduate study completed

		Full-time equivalent years of graduate study						Total graduate students	
		⩽ 1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	⩾ 6 yrs.	N	%
Distribution of students:	N	177	185	151	135	101	94	843*	
	%	21	22	18	16	12	11		100
Astronomy subfields									
Astronomical instruments and techniques		8%	13%	4%	16%	5%	2%	67	8%
Cosmology, extragalactic objects, quasi-stellar objects		19	14	19	10	18	23	143	17
Galactic structure, stellar motions		11	7	4	5	5	3	51	6
Interstellar matter and gaseous nebulae		10	12	12	10	14	14	101	12
Solar system, space astronomy of the solar system		10	5	11	10	9	9	76	9
Stellar atmospheres and spectra, stellar evolution, solar and stellar interiors		17	23	25	26	30	27	202	24
Supernovae, X, γ, and cosmic rays, pulsars		2	7	12	4	6	5	51	6
The sun		3	6	—	5	6	6	34	4
All other subfields combined		20	13	13	14	7	11	118	14
		100%	100%	100%	100%	100%	100%	843	100%

* *The percentages shown in this table are based on 552 respondents to the Graduate Student Survey. Astronomy department chairmen reported a total of 843 graduate students for the Survey of Enrollments and Degrees.*

Fig. VII. Flow diagram—Background characteristics and post-doctorate plans of 1975–76 astronomy degree recipients